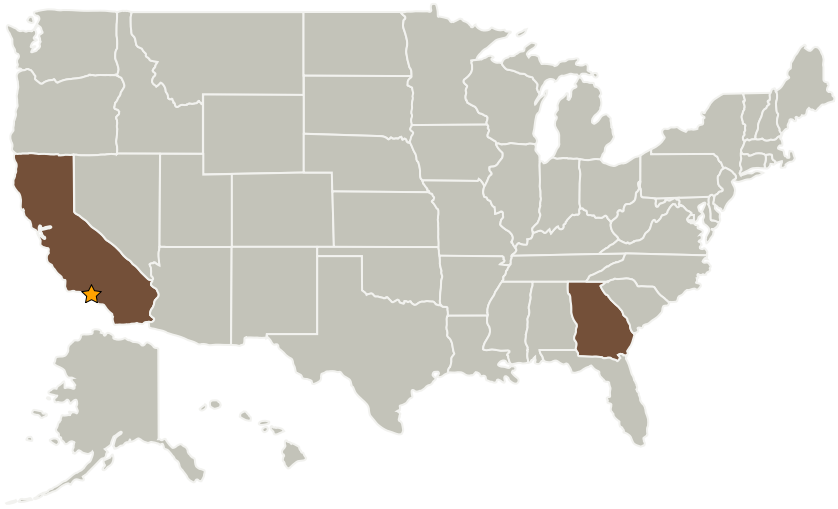
# Novel IR Detectors with Response up to 300 microns, Phase I

Completed Technology Project (2004 - 2004)

## Project Introduction

The proposed innovation is the development of a novel Heterojunction Interfacial Workfunction Internal Photoemission (HEIWIP) detector responding up to a cutoff wavelength ~300 microns using the well developed GaAs/AlGaAs system. The detection is by free carrier absorption in doped emitter layers followed by internal photoemission of the carrier over the interfacial workfunction and collection of the photoemitted carriers. The workfunction, and hence cutoff, can be adjusted by varying the composition of the emitter and barrier layers. The key properties of the proposed detectors are broadband response and the ability to tailor cutoff and a NEP of 10^{-20} W Hz^{-1/2}. In Phase II, the HEIWIP detector will be combined with an LED to form an up-conversion device whose output can be read with a conventional NIR CCD. The HEIWIP-LED detector system would have the ability to cover the range from 40-300 microns or longer in an array format without the use of a multiplexer with spatial resolution determined by the NIR CCDs. Because the HEIWIP would not be divided into pixels, the HEIWIP-LED would not have the difraction problems affecting focal plane arrays responding to 300 microns.

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Jet Propulsion Laboratory (JPL)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

**Small Business Innovation Research/Small Business Tech Transfer**

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Jet Propulsion Laboratory(JPL) | Lead Organization | NASA Center | Pasadena, California |
| NDP Optronics LLC | Supporting Organization | Industry | Mableton, Georgia |

| Primary U.S. Work Locations | |
|---|---|
| California | Georgia |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Steven G Matsik

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes